SPRUCE MOUNTAIN WIND, LLC
Site Location of Development Act//Natural Resources Protection Act
Spruce Mountain Wind Project

WILDLIFE

- Excerpts from application, dated January 19, 2010
- Comments from Maine Department of Inland Fisheries and Wildlife, dated July 6, 2010

7.0 INTRODUCTION

In early stages of project development, Spruce Mountain Wind, LLC (SMW) consulted with state and federal agencies to discuss the proposed Spruce Mountain Wind Project (Project), assess wetlands and wildlife issues and sensitivities, evaluate and refine proposed field survey protocols, and review permitting procedures. Planning meetings were held with the Maine Department of Inland Fisheries and Wildlife (Maine DIFW), Maine Department of Environmental Protection (Maine DEP), and the U.S. Army Corps of Engineers (USACE). SMW and its environmental consultant Tetra Tech, Inc. (Tetra Tech) also met with the Maine Natural Areas Program (Maine NAP), U.S. Fish and Wildlife Service (USFWS), and the Maine Historic Preservation Commission (Maine HPC). Meetings or conference calls were also held with members of the Natural Resources Council of Maine, the Nature Conservancy, the Maine Audubon Society, the Conservation Law Foundation, and the Appalachian Mountain Club to give an overview of the Project, talk about ongoing studies, answer questions, and respond to concerns.

This section summarizes the results of the SMW biological studies and field surveys conducted to assist in project siting. Attachments 7-1 through 7-4 provide detailed reports of the various field studies, including maps, data forms, photographs, and data analyses, to support the Maine DEP's Site Location of Development and Natural Resources Protection Act requirements.

7.1 Wetlands, Waterbodies, and Vernal Pools

The Maine DEP and the USACE regulate impacts to wetlands, waterbodies, and certain vernal pools in Maine pursuant to the Natural Resources Protect Act (NRPA) (MRSA 38 §§ 480A-480FF) and Section 404 of the Clean Water Act (CWA) (33 Code of Federal Regulations, Parts 320-332), respectively. These resources are protected by statute and regulations because they perform certain functions that have value to the public and to the environment.

Wetlands and waterbody surveys for the Project were conducted in August, September, and October 2009. Vernal pool field surveys were conducted between May 12 and 22, 2009 and were timed based on Maine DIFW and Maine DEP guidance, chorusing phenology of pool-breeding amphibians, and site-specific rainfall and temperature conditions. Table 7-1 provides a summary of the resources identified in the project vicinity during 2009 field surveys. Details regarding the scope of these field surveys can be found in the *Wetland and Waterbody Delineation and Vernal Pool Survey Report* (Attachment 7-1).

7.1.1 Wetlands

Following a review of background information, including United States Geological Survey (USGS) topographic maps, Natural Resources Conservation Service medium-intensity soils mapping, and high-resolution aerial photography, Tetra Tech wetland scientists performed systematic field surveys within the proposed project work limits, including an additional 125-foot buffer area on either side of the work limits. Field surveys were initiated with a walkover inspection of the area to identify topographic, drainage, and vegetation features that would indicate potential wetland and/or waterbody occurrences. Sampling locations within the distinct plant communities were then investigated using methods established in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987).

Table 7-1. Spruce Mountain Wind Project 2009 Water Resource Survey Results

Project Segment	Wetlands[1]				Waterbodies[3]			Vernal Pools[4]		
	PFO	PSS	PEM	WSS[2]	Ephemeral	Intermittent	Perennial	ABA	PVP	SVP
Transmission Line	4	0	6	6	1	7	2	3	1	0
Ridgeline	7	9	8	0	10	2	0	0	1	0
Access Road	5	0	5	3	15	5	3	3	1	0
O&M Site	0	0	7	1	3	1	2	1	0	0
Totals	**16**	**9**	**26**	**10**	**29**	**15**	**7**	**7**	**3**	**0**

1. Cowardin Wetland Types: PFO=Palustrine forested wetland; PSS=Palustrine scrub-shrub wetland; PEM=Palustrine emergent wetland. Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. FWS/OBS-79/31, USFWS, Office of Biological Services, Washington, D.C.
2. WSS=Wetlands of Special Significance: wetlands within 25 feet of a Maine DEP-regulated stream containing significant wildlife habitat or containing greater than 20,000 square feet of open water or emergent marsh vegetation.
3. Waterbody classifications:
   E = Ephemeral, flows less than 3 months of the year
   I = Intermittent, flows more than 3 months but less than 6 months of the year
   P = Perennial, flows more than 6 months of the year
4. Vernal pool classifications:
   ABA = Amphibian Breeding Area: pool does not meet NRPA criteria for vernal pools, may be regulated by USACE as an amphibian breeding area only.
   PVP = Potential Vernal Pool: pool meets Maine NRPA and USACE definition of a vernal pool, but does not meet NRPA minimum requirements for presence and abundance of certain indicator species to qualify as Significant Vernal Pools
   SVP = Significant Vernal Pool: pool meets the NRPA minimum indicator requirements for Significant Vernal Pools

At each sampling location, field data forms were completed to document vegetation, soils, hydrology, and general site characteristics. Each wetland and waterbody was further evaluated to characterize the hydrologic connection to adjacent upland, wetland, and waterbodies occurring near the investigated resource areas. Dominant wetland types found within the project area include palustrine forested wetland (PFO), palustrine scrub-shrub wetland (PSS), and palustrine emergent wetland (PEM). Determinations regarding Wetlands of Special Significance (WSS) were also made in the field during these surveys. Table 7-1 provides a summary of the wetland resources delineated during the 2009 field surveys.

Descriptions of wetlands, including a summary of dominant plant species, are included in the *Wetland and Waterbody Delineation and Vernal Pool Survey Report* (Attachment 7-1). Many of the delineated wetlands contain components of one or more of the dominant wetland types listed above. The following sections provide additional descriptions and relative occurrences of the wetlands resources delineated on site.

7.1.1.1 Emergent Wetlands

Emergent wetlands are those with more than 30 percent of their area dominated by herbaceous plants such as sedges, grasses, rushes, ferns and other forbs (Cowardin et al. 1979) and were the most common (26 of 51 wetlands) type of wetland delineated in the project area (Table 7-1). This was primarily attributed to timber harvesting which removed the forest canopy in many locations and associated woods roads, an existing cleared electric transmission corridor paralleling the proposed electric transmission line, and some locations along the ridgeline exhibiting shallow-to-bedrock soils and harsh weather conditions. Emergent wetlands are often referred to as wet meadows. Species commonly found in these wetlands include fringed sedge (*Carex crinita*), softleaf sedge (*Carex disperma*), flat top white aster (*Aster*

umbellatus), interrupted fern (*Osmunda claytoniana*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea* L. var. *cinnamomea*), and common rush (*Juncus effuses*), along with saplings of overstory trees and shrubs. Species composition of emergent wetlands did not change substantively between project segments.

Representative emergent wetlands delineated during 2009 field surveys include: AW67, TW11, RW54, OW90, and OW94.

7.1.1.2 Forested Wetlands

Forested wetlands are those with more than 30 percent of their area dominated by woody vegetation that is greater than 3 inches in diameter at breast height (dbh) (measured 4.5 feet from ground level) and greater than 6 meters (20 feet) tall (Cowardin et al. 1979). Of the 51 wetlands delineated in the project area, only 16 were classified as PFO. Prior to timber harvesting operations, this wetland type likely would have been dominant in the project area.

The majority of the forested wetlands in the survey area occur along the ridgeline, largely because timber harvesting occurred with less frequency in these areas. Typical tree species found in these wetlands include gray birch (*Betula populifolia*), red spruce (*Picea rubens*), black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and red maple (*Acer rubrum*) in the overstory, with mountain holly (*Ilex mucronata*), cat berry (*Nemopanthus mucronatus*), witherrod (*Viburnum cassinoides*), hobble bush (*Viburnum lantanoides*) and highbush blueberry (*Vaccinium corymbosum*) in the shrub layer. Various ferns including New York fern (*Thelypteris noveboracensis*), intermediate woodfern (*Dryopteris intermedia*), lady fern (*Athyrium filix-femina*), *Carex* sedges, and *Sphagnum* moss were found in the herbaceous layers. Representative forested wetlands found on the ridgeline include RW21, RW24, and RW25.

Forested wetlands located along the access road, particularly at lower elevations, were more commonly dominated with deciduous species, including red maple, yellow birch (*Betula alleghaniensis*), and green ash (*Fraxinus pennsylvanica*). Shrub layers in these wetlands often contain immature versions of the overstory trees along with hobble bush and witch hazel (*Hamamelis virginiana*) and dense layers of various species of wetland ferns along with *Carex* species in the herbaceous layer. Representative forested wetlands found along the access road include AW67, AW70, and AW87.

Forested wetlands located along the proposed transmission line route (a south-facing slope) were also dominated by deciduous species including red maple, yellow birch, and green ash. Shrub layers in these wetlands also contained immature versions of the overstory trees and typically had dense stands of ferns and *Carex* species in the herbaceous layer. Representative forested wetlands found along the transmission line corridor include TW01, TW04, and TW08.

7.1.1.3 Scrub-Shrub Wetlands

Scrub-shrub wetlands include areas dominated by woody vegetation less than 6 meters (20 feet) tall and less than 3 inches in dbh (Cowardin et al. 1979). Scrub-shrub wetlands are typically comprised of true shrubs, young trees, and trees and shrubs that are stunted due to environmental conditions (Cowardin et al. 1979). Scrub-shrub wetlands were the least common (9 of 51 wetlands) type of wetland encountered during field surveys (Table 7-1). All of the PSS wetlands delineated during field surveys occur along the ridgeline and were dominated by hobble bush, cat berry, mountain holly, and witherrod in addition to

stunted black spruce, red maple, and balsam fir. Representative scrub-shrub wetlands found along the ridgeline include RW26, RW28, and RW33.

7.1.2 Waterbodies

Fifty-one waterbodies were identified in the project area during field surveys, including seven perennial streams, 15 intermittent streams, and 29 ephemeral drainages. Table 7-2 provides a summary of the waterbodies identified along each project segment and jurisdictional authorities for those resources.

Table 7-2. Spruce Mountain Wind Project Waterbody Resource Summary

Project Segment	Waterbodies[1]				Jurisdiction[2]	
	Ephemeral	Intermittent	Perennial	Total Streams per Segment	Both Maine DEP & USACE	USACE Only
Transmission Line	1	7	2	10	7	2
Ridgeline	10	2	0	12	0	2
Access Road	15	5	3	23	4	4
O&M Site	3	1	2	6	3	0
Totals	**29**	**15**	**7**	**51**	**14**	**8**

1. Waterbody classifications: E = Ephemeral, flows less than 3 months of the year; I = Intermittent, flows more than 3 months of the year but generally less than 6 months; P = Perennial streams flow more than 6 months of the year and are likely to flow year-round.
2. There are instances where stream resources did not meet the Maine DEP's definition of a river, stream, or brook, but would still be regulated by the USACE based on the federal jurisdictional definitions.

The Maine DEP regulates waterbodies based on criteria specified in the NRPA (38 MRSA § 480.B. Definitions). The following provides the definition of a river, stream, or brook pursuant to NRPA:

> *A river, stream or brook means a channel between defined banks. A channel is created by the action of surface water and has 2 or more of the following characteristics.*
> *A. It is depicted as a solid or broken blue line on the most recent edition of the U.S. Geological Survey 7.5-minute series topographic map or, if that is not available, a 15-minute series topographic map.*
> *B. It contains or is known to contain flowing water continuously for a period of at least 6 months of the year in most years.*
> *C. The channel bed is primarily compose d of mineral material such as sand and gravel, parent material or bedrock that has been deposited or scoured by water.*
> *D. The channel contains aquatic animals such as fish, aquatic insects or mollusks in the water or, if no surface water is present, within the stream bed.*
> *E. The channel contains aquatic vegetation and is essentially devoid of upland vegetation.*
> *"River, stream or brook" does not mean a ditch or other drainage way constructed, or constructed and maintained, solely for the purpose of draining storm water or a grassy swale.*

Tetra Tech developed field data forms designed specifically for making field determinations of Maine DEP stream criteria B through E, including a determination as to whether or not the resource appears to be a river, stream or brook and not a man-made drainage way.

Several classes of waterbodies are subject to federal jurisdiction under the CWA, including traditional navigable waters (TNWs), non-navigable tributaries of TNWs that are relatively permanent (typically flow year-round or have continuous flow at least seasonally [e.g., typically three months]), and wetlands that directly abut relatively permanent waters (USACE RGL 07-01).

As indicated in Table 7-2, several waterbodies did not meet Maine DEP's definition as a river, stream, or brook, but did qualify as a regulated waterbody pursuant to USACE criteria.

Ephemeral drainages that are not relatively permanent based on USACE definitions are not regulated by the Maine DEP or the USACE; however, these resources were located using a Global Positioning System (GPS) device during field surveys to support the engineering design.

7.1.3 Vernal Pools

Tetra Tech conducted vernal pool field surveys between May 12 and 22, 2009. These field surveys were conducted during the optimal time for egg mass counts (generally one to two weeks following the start of peak chorus activity of pool-breeding amphibians). Although the standard peak for central Maine based on Maine DEP guidance is April 25 to May 10, surveys commenced on May 12 based on guidance provided by Maine DIFW and chorusing phenology, as well as assumptions about peak breeding times at higher elevations and specific rainfall and temperature conditions at this site prior to field surveys.

Chapter 335 of the NRPA establishes state regulatory authority over Significant Vernal Pools (SVPs) as significant wildlife habitat. Chapter 335 details specific definitions and standards regarding the characterization and protection of SVPs in Maine. In particular, it states that unavoidable impacts to a SVP, which includes the critical terrestrial habitat within 250 feet of the high water line of the actual vernal pool, may require an Individual NRPA Permit. NRPA Permit by Rule (PBR) Standards, Chapter 305 Section 19, allows for some activities within 250 feet of SVPs or potential SVPs if the standards of this PBR can be met. If impacts to the SVP cannot be avoided and the standards of the PBR cannot be met, an Individual NRPA Permit may be required.

The Programmatic General Permit (PGP) for the state of Maine, issued by the USACE for projects involving "minimal" wetland impacts, also addresses protection of vernal pools. Pursuant to the USACE's Maine PGP, projects are required to avoid and minimize impacts to uplands within 500 feet of any vernal pool. If a USACE application is reviewed by the USFWS or the U.S. Environmental Protection Agency, this recommended area of upland protection may be extended to 750 feet.

The Project will also be regulated pursuant to Chapter 375, Site Location of Development (Site Law). Vernal pools that are ecologically significant on a landscape level may also be regulated by Maine DEP pursuant to the Site Law. Under some circumstances, setbacks from high-functioning vernal pools beyond 250 feet may be required by Maine DEP.

The following is an overview of the results (also in Table 7-1) of the spring 2009 vernal pool survey:

- Transmission Line: one Potential Vernal Pool (PVP) and three Amphibian Breeding Areas (ABAs) were identified within the transmission line portion of the Project. Of the four resources evaluated, none met NRPA minimum indicator requirements for SVPs.
- Ridgeline: One PVP was identified along the ridgeline portion of the Project. This resource did not meet NRPA criteria for SVPs.

- Access Road: The access road portion of the Project includes one PVP and three ABAs. None of these resources met NRPA criteria for SVPs.
- O&M Building Site: One ABA was identified east of the O&M building site.

Vernal pool surveys identified three PVPs and seven ABAs in the project area. Based on Tetra Tech's 2009 surveys, none of these pools meet Maine DEP criteria as SVPs and, therefore, are not regulated pursuant to Chapter 335 of NRPA regulations as significant wildlife habitat. PVPs and ABAs may be subject to regulation by the USACE pursuant to the PGP and by the Maine DEP through the Site Location of Development Act Regulations.

SMW prioritized avoidance and minimization of impacts to PVPs and ABAs during the design phase of the Project and was able to avoid direct impacts to all of the PVP and ABAs identified during 2009 field surveys.

It should be noted that project modifications implemented during the resource impact avoidance and minimization phase resulted in two sections of the current project layout falling outside of the spring 2009 vernal pool survey limits. These areas can be seen on Figure 1-2, in Attachment 7-1. Due to relatively steep slopes in both of these areas, it is unlikely that vernal pools would be present; however, absence of vernal pools has not been confirmed based on field surveys for these two areas. More details regarding vernal pool survey methods and locations of these resources can be found in Attachment 7-1.

7.1.4 Wetlands, Waterbody, and Vernal Pool Impact Summary

SMW prioritized avoidance and minimization of impacts to protected wetlands, waterbodies, PVPs and ABAs during the design phase of the Project. There will be no direct impacts to PVPs and ABAs as a result of construction or operations of the Project. SMW will retain intact adjacent terrestrial habitat surrounding PVPs and ABAs to the greatest extent practicable.

Of the 51 freshwater wetlands surveyed, 13 will be impacted by the Project. Of these 13 wetlands, five will be impacted by permanent fill, and eight will be impacted by clearing activities and temporary matted construction crossings. Table 7-3 provides a summary of temporary and permanent wetland impacts associated with the Project.

Table 7-3. Spruce Mountain Wind Project Wetland, Waterbody, Vernal Pool Impact Summary

Project Segment	Permanent Wetland Fill (square feet)	Temporary Wetlands Alterations (square feet)	Vegetation Clearing (square feet)	Stream Crossings (linear feet)	PVP or ABA (number)
Transmission Line ROW	0	6,622	19,663	132	0
Ridgeline Access Road	2,031	458	0	13	0
Access Road	3,687	755	0	252	0
O&M Site	0	0	0	0	0
Totals	**5,718**	**7,835**	**19,663**	**397**	**0**

Of the 51 waterbodies delineated in the project area, three (two perennial and one intermittent) would require permanent crossings for construction of the proposed access road. Two additional access road intermittent streams would be temporarily altered during construction and restored following construction. An additional eight streams (two perennial and six intermittent) would be crossed with timber mat bridges during construction of the proposed electric transmission line. Table 7-3 provides a summary of waterbody impacts associated with the Project.

7.1.5 Impact Avoidance and Minimization

In an effort to avoid wetlands and waterbody impacts, Tetra Tech performed pre-design reconnaissance field surveys covering approximately 1,000 acres and including the north, south, east, and west slopes of Spruce Mountain (see Figure 1-2 Appendix 7-1) during the spring of 2009. The objective of these surveys was not to formally delineate all resources but to identify which approaches to the ridge had fewer protected resources and favorable topographic conditions for an access road. Tetra Tech field biologists recorded GPS points at each resource crossing and these data were used, in combination with high resolution aerial photography, to determine the least-impact locations for proposed facilities.

Following this process, SMW prepared preliminary engineering designs. Preliminary designs were used to determine the limits of wetland and waterbody field delineations. Tetra Tech performed on-site wetland and waterbody delineations based on the outer work limits determined by the preliminary project design plus an additional 125-foot buffer surrounding the entire work limits to allow for adjustments during the impact avoidance and minimization process.

Following field delineations and resource mapping, initial project impacts were calculated at 1.3 acres (Table 7-4) based on the preferred engineering design. This project design would have impacted 17 state and federal jurisdictional wetlands, including 4 Maine WSS, and 14 state and federal jurisdictional streams. Temporary and permanent wetlands impacts would have exceeded one acre (56,718 square feet or 1.3 acres) and approximately 1,423 linear feet of streams would have been impacted.

Table 7-4. Project Impacts Associated with the Preferred Engineering Alternative

Access Road Streams	Access Road Wetlands	Ridgeline Streams	Ridgeline Wetlands	Transmission Line Streams	Transmission Line Wetlands
AS64	AW70	RS48	RW21	TS02	TW01
AS68	AW72		RW24	TS03	TW05
AS69	AW74		RW28	TS06	TW11
AS80	AW81		RW35	TS09	TW14
			RW36	TS10	TW16
			RW55	TS12	
				TS13	
				TS17	
				TS18	
701 linear feet (l.f.)	4,517 square feet (ft^2)	109 l.f.	2,521 ft^2	511 l.f.	49,680 ft^2

SMW then embarked on an iterative process, working with Tetra Tech's environmental scientists, to make adjustments and modifications to the engineering layout that would avoid and minimize impacts to protected wetland and waterbody resources. These design modifications are summarized as follows:

Impact Avoidance Design Modifications:

RW21: work limits for turbine foundation 1 were shifted west to avoid impacts to wetland RW21.
RW24: work limits for turbine foundation 2 were shifted south to avoid impacts to wetland RW24.
TW11: transmission line corridor was shifted east to avoid impacts to WSS TW11.
RW35: work limits for turbine foundation 4 were shifted west to avoid permanent impacts to wetland RW35.
RW36: fill extension at the base of turbine foundation 4 was reduced to avoid permanent impacts to wetland RW36.
OS93: The proposed O&M building was relocated from its original location at the intersection of Shagg Pond Road and east of the proposed access road (directly adjacent to Stream OS93) to the west side of the access road and approximately 200 feet south of Shagg Pond Road. This design change avoids removal of the existing forested buffer along stream OS93, a high-value stream that provides habitat for northern spring salamanders and also maintains a visual buffer between the O&M building and Shagg Pond Road.

Impact Minimization Design Modification:

AW70: fill extensions on access road were adjusted to minimize permanent wetland impacts to AW70. Clearing limits were also reduced to minimize temporary impacts to wetland AW70.
RW35: clearing limits west of turbine foundation 4 were reduced to minimize temporary impacts to wetland RW35.
TW14: proposed permanent transmission line right-of-way was shifted east to reduce permanent conversion of PFO to PSS by 3,039 square feet.
TW16: proposed permanent transmission line ROW was shifted east to reduce permanent conversion of PFO to PSS by 22,211 square feet.
TS15: power pole 17 was relocated 30 feet north to maintain a 100 feet setback from stream TS15.
TS12: power pole 23 was relocated 5 feet north to maintain a 100 foot setback from stream TS12.
TS17: power pole 15 was relocated 30 feet south to maintain a 100 foot setback from stream TS17.

Impact Minimization Construction Practices:

- SMW will install erosion and sedimentation measures, where appropriate, before commencing ground disturbing work in, or adjacent to, protected natural resources in accordance with the Maine DEP's Stormwater *Basic Standards* and as described in Section 12 of this application and shown in (Exhibits 1 and 2) attached to this application.

- Construction of the proposed electric transmission line extending from the ridgeline to Cushman Road will be performed in the winter during frozen ground conditions. Impacts to wetlands and streams will be minimized by using timber mat bridges to cross streams and wetlands that are saturated to the surface at the time of crossing.

Impact Minimization During Operations:

- SMW will maintain the proposed electric transmission line corridor in compliance with the Post-Construction Vegetation Management Plan (VMP) presented as Attachment 10-1 of this application. This VMP was prepared in accordance with Maine DEP's Chapter 375, *Minimum Performance Standards for Electric Utility Corridors.*

- In addition, in an effort to avoid unintentional post-construction impacts to protected resources, SMW will maintain stormwater management facilities in proper working order and will inspect and maintain these facilities in accordance with Maine DEP's Chapter 500 requirements.

7.1.6 Wetlands Functions and Values and Compensation

In accordance with the NRPA's Chapter 310, *Wetland and Waterbody Projection Rules*, 5(C)(6)(a)(ii), the Project is exempt from the requirements for a formal wetlands function and values assessment and compensation because permanent impacts to freshwater wetlands would be less than 15,000 square feet. In addition, SMW has demonstrated that impacts to protected resources have been avoided and minimized to the greatest extent practicable, resulting in a Project that represents the Least Environmentally Damaging Practicable Alternative (LEDPA).

7.2 Rare Threatened and Endangered Species Surveys

During the consultation process with the Maine DIFW, the Maine NAP, the USFWS and the Maine Audubon Society, SMW sought information regarding any known or potential rare, threatened or endangered species that might exist in the proposed project area. This effort also included collecting existing data on significant habitat areas mapped by the agencies for waterfowl-wading bird habitat, deer wintering areas and eagle nests, none of which exist in the proposed development area. Discussions with agency staff during the study planning process also resulted in SMW field surveys generally including recording observations of any protected reptile, amphibian and mammal species, and protected plant species. A separate discussion with Maine DIFW concerning Bicknell's Thrush (a State Species of Special Concern) and its associated habitat concluded that the SMW project area did not have the combined elevation and habitat conditions conducive to supporting this species. In addition, none were observed during the avian surveys summarized in Section 7.3 and described in more detail in Attachments 7-3 and 7-4.

Although no state or federally listed rare, threatened or endangered species were previously documented in the project area, agency staff requested that field studies be conducted to look for two state-listed species. Tetra Tech conducted field surveys to evaluate the SMW project area for the presence of the northern spring salamander (*Gyrinophilus p. porphyriticus*), a Maine species of special concern, and the Roaring Brook mayfly (*Epeorus frisoni*), a Maine endangered species. Surveys included site reconnaissance to identify suitable habitat within the project area for these two species and field sampling to determine the presence of these species within suitable streams. Field study protocols for each species were provided by Maine DIFW staff, and field surveys were conducted in the August-September time frame, as requested. Attachment 7-2 provides a detailed report of these field surveys and their findings.

Northern spring salamander field surveys were conducted on August 21, 25, and 26, 2009, and the salamanders were observed in four streams within the project area: two near the proposed access route and the O&M facility and two along the proposed overhead electric transmission line corridor. Details of the northern spring salamander survey are presented in Section 7.2.1.

The Roaring Brook mayfly field surveys were conducted on September 9 and 14, 2009. Two flat-headed mayflies belonging to the genus *Epeorus* were collected from one of the project streams and submitted to a mayfly taxonomist for identification. Results of the identification concluded that these were not Roaring Brook mayflies.

No observations of any other protected reptile, amphibian, or mammal species occurred during the 2009 biological field surveys.

In addition, Maine NAP staff identified no incidence of rare, threatened or endangered plant species within the SMW project area (see Attachment 9-1). They did indicate the existence of two rare natural communities (Maple-Basswood-Ash Forest and Birch-Oak Rocky Woodland) that are located outside of the project area, approximately one mile east and downslope from the project area. Biologists conducting field surveys did not locate similar natural communities within the project development area and did not observe any rare, threatened or endangered plants within the proposed SMW development area.

7.2.1 Northern Spring Salamander Survey

The spring salamander investigation included both a background data review and subsequent field surveys. The field surveys followed a protocol developed by Maine DIFW in collaboration with Beth Swartz and Jonathan Mays, biologists for the state of Maine. The report in Attachment 7-2 provides a description of the methods used during both the background review and field survey for northern spring salamanders.

Potential locations of suitable habitat for spring salamanders within the project area were first evaluated by conducting a desktop review of USGS 7.5-foot topographic maps and GIS-generated maps highlighting elevation and hydrology for the project area. In addition, preliminary stream data collected in spring 2009 were also reviewed to identify other unmapped streams containing potential spring salamander habitat. This information was compiled to generate a list of streams to investigate for suitable habitat during the subsequent site reconnaissance survey. The desktop review identified a total of 11 streams for survey.

Surveys of these streams were conducted in all appropriate stream habitats located within 500 feet of the proposed project centerline. Per Maine DIFW recommendations, the stream sampling was conducted on August 21, 25, and 26, 2009. In addition, sampling was conducted during normal, low and stable flow periods to ensure that all wetted areas of the channels were consistently part of the habitat, excluding areas that were only wetted during times of high flow.

The following describes the specific methods that were used for sampling for northern spring salamander:

- Stream searches involved walking along or within a stream, moving upstream whenever possible, and looking under stones and large rocks along the margin of the stream or in shallow areas within the stream itself. Although larger, flatter, partially submerged rocks are preferred by adult northern spring salamanders, biologists searched a wide array of rock sizes ranging from approximately 6 inches to 2 feet in diameter in an attempt to identify larval individuals.
- Streams were not surveyed during high flow events because many suitable cover objects could be inaccessible and stream visibility is reduced.

- Timed searches of no less than 60/30 minutes (single-person/two-person) were performed for each section/site.
- All northern spring salamanders were documented through photography and completion of a Rare Animal Form. Non-rare, -threatened, or -endangered (non-RTE) species of amphibians and reptiles observed were also documented.

For all streams where northern spring salamanders were observed, data recorded on the field sheet included, but were not limited to, survey start and end time, waterbody name (if known), stream habitat description (substrate, flow regime, approximate slope), and upland habitat description (forest types, dominant species, and visual estimation of canopy cover). The location of each spring salamander observed and/or captured was recorded using GPS.

Survey Results

A total of ten larval and three adult spring salamanders were found in four of the eleven streams surveyed: TS12, TS18, AS69, and OS93. In addition, non-RTE salamanders were observed in six streams. A total of eight larval northern two-lined salamanders (*Eurycea bislineata*) were found in streams TS03, TS09, AS65, and AS69, and a total of 32-39 larval northern dusky salamanders (*Desmognathus fuscus fuscus*) were found in streams TS03, TS10, AS68, and AS69. No amphibians or reptiles were observed in stream AS58, and stream AS59 contained two adult northern red back salamanders (*Plethodon cinereus*), including one erythristic color morph. Maine DIFW Rare Animal Survey Forms and Maine Amphibian and Reptile Atlasing Project (Maine ARAP) site cards were completed for the 2009 northern spring salamander survey.

Stream TS18 (Andrew's Brook)

On August 21, 2009, five larval spring salamanders were observed in Stream TS18. This perennial stream, also known as Andrew's Brook, is located along the proposed transmission line at approximately the half-way point between the southern end of the turbine string and Cushman Road. Stream TS18 is 5 to 8 feet wide (bankfull) in the project area with a slope ranging from 8 to 10 percent. The stream's substrate is composed of gravel and cobble, with cobble and small boulder-lined banks that are 1 to 3 feet high. No submerged vegetation was observed within the stream channel. Canopy cover was estimated at 76 to 100 percent. The surrounding community was northern hardwood forest dominated by striped maple (*Acer pensylvanicum*), sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), red maple, yellow birch, hobblebush, and wild sarsaparilla (*Aralia nudicaulis*). A dirt access road runs parallel to Stream TS18 on the south side, and a cleared right-of-way is also located to the south of the stream. All five of the spring salamander larvae were found under large cobble in approximately 2 to 4 inches of water along the stream edge.

Stream TS12

On August 25, 2009, three larval and one adult spring salamander were observed in Stream TS12. Stream TS12 is a perennial stream located along the proposed transmission line to the north of Cushman Road. TS12 is 8 to 10 feet wide (bankfull) and has a slope of approximately 12 to 15 percent within the project area. The substrate is composed of sand, gravel, and cobble. Numerous small boulders were observed within the channel. The surrounding community is northern hardwood forest. Canopy cover, where present, is 75 to 85 percent. Dominant species within the adjacent forested community are sugar maple,

striped maple, and white birch; these species also dominate the sapling layer. Common herbaceous species include whorled wood aster, wild sarsaparilla, cinnamon fern, and false solomon's seal. The four northern spring salamanders were found 40 to 240 feet west (upstream) of the cleared transmission line right-of-way. Specifically, these individuals were observed beneath cobble in 3 to 5 inches of standing water in small side pools that were out of the direct current. A small stream was draining into the pool where the adult and one larval spring salamander were observed.

Stream OS93

On August 25, 2009, one larval and two adult spring salamanders were observed in Stream OS93. OS93 is a perennial stream that is located within the proposed footprint of the O&M facility on Shagg Pond Road at the northern end of the proposed access route. Stream OS93 is 8 to 10 feet wide (bankfull) with gravel and cobble substrate, scattered small boulders, and short steep banks approximately 1 to 3 feet high. The slope of the stream within the survey area ranged from 8 to 10 percent. Canopy cover over the stream is between 76 to 100 percent and the surrounding community is northern hardwood forest. Dominant tree species within this community include American beech, sugar maple, striped maple, white ash (*Fraxinus americana*), and red maple. Dominant herbaceous plants include false solomon's seal (*Maianthemum racemosa*), Canada mayflower (*Maianthemum canadense*), whorled wood aster (*Oclemena acuminata*), cinnamon fern (*Osmunda cinnamomea*), and wild sarsaparilla. All three spring salamanders were found under large cobble in a slow section of the stream, approximately 150 feet upstream of where OS93 flows through a culvert under Shagg Pond Road. This culvert had been replaced within the weeks prior to the survey, and there was evidence of grading along the banks and within the stream channel just to the north (downstream) of where the northern spring salamanders were found. It is likely that no erosion or sediment controls were utilized during this soil-disturbing work. In addition to the road construction, existing forest/logging roads are present to the south (upstream). Evidence of erosion within these roads and sedimentation into OS93 was observed during wetland delineation field work.

Stream AS69

Stream AS69 was surveyed on August 25, 2009. During the survey, one larval northern spring salamander was observed. The individual observed could not be captured so no photos were obtained. Subsequent searching within the stream did not yield any other northern spring salamanders. However, five northern two-lined salamanders and approximately 15 to 20 northern dusky salamanders were identified during the search.

Stream AS69 is a small, perennial stream approximately 5 feet wide (bankfull) with a slope of 25 to 28 percent. The substrate is composed of gravel and medium to large cobble. The 1- to 2-foot high banks are lined with small boulders. The surrounding community is mixed forest dominated by striped maple, American beech, northern hemlock (*Tsuga canadensis*), and yellow birch.

7.3 Avian and Bat Surveys – Spring and Fall 2009

As part of the facility siting and permitting process, SMW contracted Tetra Tech to design a bird and bat study work plan following the methodologies developed for evaluating bird and bat interactions with wind turbines in Maine (Jones 2006) and presented the scope to the Maine DIFW. The work scope was accepted by Maine DIFW during agency consultation meetings from January to March 2009. The work plan consisted of bird and bat surveys during the spring migration, summer residency, and fall migration

periods of 2009. The purposes of these surveys were to document avian and bat occurrence in the study area, to provide baseline information on the avian and bat communities around the project area, and to facilitate a project design that minimizes potential environmental impacts.

Detailed reports of these study results are provided in Attachment 7-3 (Spring 2009 report) and Attachment 7-4 (Fall 2009 report).

7.3.1 Spring 2009 Studies

During spring 2009 Tetra Tech conducted field surveys to document avian and bat activity at the project area. Surveys included avian radar surveys, visual raptor migration surveys, migrant avian stopover surveys, breeding bird surveys, and bat acoustic surveys. The results from the spring 2009 surveys are summarized below.

Avian Radar Study

During spring migration season (April 15 to May 31), a MERLIN avian radar system used horizontal and vertical radars simultaneously to automatically and continuously record passage rates and heights of migrating birds and bats. Nightly target passage rates were variable, ranging from 7.2 to 1,714.9 targets/km/hr, with a nightly average of 409.1 targets/km/hr. This nightly average was greater than the daily average target passage rate (147.8 targets/km/hr). The hourly activity analysis showed that the hours of 8 p.m. through 3 a.m. had the greatest average target passage rates. In addition, target passage rates were evenly distributed throughout the survey period.

The majority (76.2 percent) of all targets detected at night during spring migration were well above the top of the rotor-swept zone (RSZ) of the proposed turbine (for a 256-foot tower, and a 295-foot rotor diameter, the RSZ is 109 to 404 feet above ground level). Data was similar for targets detected during the day - 83.4 percent were detected above the RSZ. A total of 16.5 targets (10.7 percent) were within the RSZ during nights and days, and 7.3 targets (5.8 percent) were below the RSZ during nights and days, respectively. Nightly target passage rates averaged 309.3 targets/km/hr above the RSZ, and only 69.4 and 30.4 targets/km/hr within and below the RSZ, respectively. Daily target passage rates averaged 124.0 targets/km/hr above the RSZ, and only 15.4 and 8.4 targets/km/hr within and below the RSZ, respectively.

The average mean target height over all nights of spring migration 2009 was 1,202.8 feet (range: 552.4 to 3,163.2 feet), while the average median height was 970.2 feet (range: 256.8 to 3,270.1 feet). During days, the average mean target height was slightly lower at 1,016.1 feet (range: 501.5 to 3,236.7 feet) and the average median height was 877.7 feet (range: 133.8 to 3,308.2 feet).

Most nights (64 percent) had target movements predominantly to the northeast and an additional 24 percent to the north or east. Horizontal radar data indicated an average target direction of northeast during both nights (43.5°) and days (44.9°). Target passage rates were greatest on nights providing good tailwinds (southwest) and lowest on nights with winds opposing primary target direction (northeast), but were not correlated with wind speeds or rain. Both passage rates and target heights were lower during daylight than at night and direction concentration more dispersed in the day.

Raptor Migration Study

The spring 2009 field surveys included 10 days of direct, visual observation of raptors between April 5 and May 19, 2009. A total of 206 raptors representing 13 species were documented during the surveys. The overall passage rate of migrating raptors was 3.32 birds/hour. Daily count totals ranged from 0 to 55 birds. Flight heights at the start of observed flights varied, with the majority (52 percent) of migrants (107 observations) flying above 426.4 feet, followed by 40 percent of migrants (83 observations) flying between 118.1 and 426.4 feet, and 8 percent (16 observations) below 114.8 feet. Broad-winged hawks (*Buteo platypterus*) (73 observations) were the most common species observed. Turkey vultures (*Cathartes aura*) (68 observations) were the next most abundant species, followed by osprey (*Pandion haliaetus*) (17 observations), red-tailed hawks (*Buteo jamaicensis*) (13 observations), sharp-shinned hawks (*Accipiter striatus*) (13 observations), and American kestrel (*Falco sparverius*) (8 observations). The remaining seven species comprised less than 6 percent of the total (each species with four or less individuals observed). Two of these were Species of Special Concern in the State of Maine; one northern harrier (*Circus cyaneus*) and two bald eagles (*Haliaeetus leucocephalus*) were observed during the survey.[1] The project area had relatively low passage rates when compared to the Bradbury Mountain hawk watch site.

Migrant Stopover Study

The spring 2009 field surveys included eight migrant stopover surveys that used point count methods to determine the number and species of migrant stopover birds at 15 survey points along two transects. All birds that were visually or audibly detected at each survey point were recorded during 5-minute sampling periods. Survey points were distributed across varying elevations and targeted two major habitat types: mixed deciduous hardwood and mixed spruce and fir. A total of 479 individual birds were documented representing 55 species and 22 families. Overall relative abundance was 3.99 birds/point. Eight avian Species of Special Concern were documented during the spring 2009 migrant stopover surveys. They were the wood thrush (*Hylocichla mustelina*), veery (*Catharus fuscescens*), American redstart (*Setophaga ruticilla*), black-and-white warbler (*Mniotilta varia*), chestnut-sided warbler (*Dendroica pensylvanica*), yellow warbler (*Dendroica petechia*), white-throated sparrow (*Zonotrichia albicollis*), and eastern towhee (*Pipilo erythrophthalmus*). The vast majority of these species were found below 1,968 feet (MSL). No federally listed threatened or endangered species were documented during the spring 2009 migrant stopover surveys.

Breeding Bird Study

The spring 2009 field surveys included four surveys in June that used point count methods to determine the number and species of breeding birds at 15 points along two transects. All birds that were visually or audibly detected were recorded during 10-minute sampling periods. Survey points were distributed across varying elevations and targeted two major habitat types: mixed deciduous hardwood and mixed spruce and fir. A total of 336 individual birds were documented, representing 43 species and 17 families. Overall relative abundance was 5.6 birds/point. Ten Species of Special Concern were documented during the spring 2009 breeding bird surveys. They were the wood thrush, veery, American redstart, black-and-white warbler, chestnut-sided warbler, prairie warbler (*Dendroica discolor*), yellow warbler, white-throated

[1] Bald eagles are federally listed as "Delisted-Taxon Recovered" by USFWS.

sparrow, olive-sided flycatcher (*Contopus cooperi*), and eastern towhee. No federally listed threatened or endangered species were documented during the spring 2009 breeding bird surveys.

Bat Acoustic Study

The spring 2009 field surveys included two months (April 1 to May 31) of passive bat monitoring using three acoustic bat detectors to quantify bat use of the project area. Two bat detectors were located at the on-site meteorological tower (high, 98.4 feet above ground level, and middle, 49.2 feet above ground level), and one detector was located at the on-site radar unit (low, 16.4 feet above ground level). Sampling for 61 nights resulted in 732 detector-hours and 16 bat call sequences. Detectors monitored bat echolocation calls for approximately 12 hours per night. The middle detector had the highest rate of detection (0.16 call sequences/night), and the high and low detectors had identical rates of detection (0.0041 call sequences/night). Four bat species were documented during the spring 2009 bat acoustic surveys. Two state-listed Species of Special Concern were detected, the hoary bat (*Lasiurus cinereus)* and silver-haired bat (*Lasionycteris noctivagans)*. No calls from federally-listed threatened or endangered species were recorded. The relative activity patterns demonstrate that bats use the area starting in May at a low magnitude, and there were no definable peaks in activity centered on migration events during spring 2009.

7.3.2 Fall 2009 Studies

During fall 2009 Tetra Tech conducted field surveys to document avian and bat activity at the project area. The fall 2009 surveys were the second of the two migratory seasons sampled during the overall study. Fall surveys included an avian radar survey, visual raptor migration survey, migrant stopover survey, and a bat acoustic survey.

The results of these surveys provide useful data on temporal and spatial use of the project area by birds and bats. The fall 2009 surveys create a baseline data set to compare to any future post-construction surveys.

Avian Radar Study

A MERLIN avian radar system used horizontal and vertical radars simultaneously to automatically and continuously record bird and bat activity in the vicinity of the proposed project area during the fall migration survey (August 24 to October 19). The Vertical Surveillance Radar (VSR) data provided both count and altitude information on targets up to 4,557 feet (1,389 m) above ground level (AGL), while the Horizontal Surveillance Radar (HSR) provided target directions.

Nightly target passage rates were variable, ranging from 6.0 to 1,681.4 targets / km / hr, with a nightly average of 480.1 targets / km / hr. This was greater than the average target passage rates during days (215.3 targets / km / hr). The hourly activity analysis confirmed that the hours of 7 pm through 11 pm had the greatest average target passage rates.

The majority (79.2 percent) of all targets detected during nights of fall migration were well above the top of the RSZ of the proposed wind turbine (109 to 404 feet above ground level); this was similar to targets recorded above the rotor swept height during days (79.2 percent). A total of 16.0 and 15.2 percent of targets were within the RSZ during nights and days, respectively; and 4.8 and 5.6 percent were below the RSZ during nights and days, respectively. Target passage rates above the RSZ averaged 379.4 targets / km / hr at night and 170.4 targets / km / hr during the day. Target passage rates within the RSZ were

77.3 and 32.5 targets / km / hr during nights and days, respectively. Target passage rates below the RSZ were 23.4 and 12.3 targets / km / hr during nights and days, respectively.

The average mean target height over all nights of fall migration 2009 was 1,036.7 feet (range 580.1 to 1,779.9 feet) while the average median height was 888.8 feet (range 312.0 to 1,695.9 feet). During days, the average mean target height was slightly lower at 773.3 feet (range 107.9 to 2,636.2 feet), and the average median height was 674.2 feet (range 38.1 to 3,946.5 feet). The overall mean target height for the entire fall season was 1,053.1 feet, while the overall median target height was 892.4 feet. All mean target heights were above the RSZ during nights, but three days had mean target heights below the top of the RSZ of 404 feet. Several median target heights occurred within the RSZ during both nights and days.

As would be expected during fall migration, target movements were predominantly to the southwest or south (75 percent of nights). Radar data from the horizontal radar indicated an average target direction of southwest during both nights (220°) and days (206°). The concentration of target movements however, was greater during nights (average r = 0.66) than days (average r = 0.44).

Target passage rates were greatest on nights with southwest movement and nights providing good tailwinds (from the northeast) and lower on nights with winds opposing primary target direction. Target passage rates tended to be lower on nights with rain but were not correlated with wind speeds. Both passage rates and target heights during daylight were lower than night, and direction concentration was more dispersed during the day.

Raptor Migration Study

The fall 2009 field surveys included 10 days of direct, visual observation between August 28, 2009 and October 15, 2009. A total of 107 raptors representing 11 species were documented during the surveys. The overall passage rate of migrating raptors was 1.79 birds/hour. Daily count totals ranged from 0 to 35 birds. Flight heights at the start of their observed flight varied with the majority (80 percent) of migrants (86 observations) flying above 426.4 feet (above the proposed RSZ), followed by 12 percent of migrants (13 observations) flying between 118.1 and 426.4 feet, and 7 percent (8 observations) below 114.8 feet. Broad-winged hawks (54 observations) were again the most common species observed. Sharp-shinned hawks (15 observations) were the next most abundant species, followed by red-tailed hawks (10 observations), and turkey vultures (10 observations). The remaining seven species comprised less than 17 percent of the total (each species with three or less individuals observed). Three birds from two state-endangered species were observed during the survey: one golden eagle and two peregrine falcons. The project area had relatively low passage rates when compared to the Cadillac Mountain and Mt. Monadnock hawk watch sites.

Migrant Stopover Study

The fall 2009 field surveys included 10 days of migrant stopover surveys that used point count methods to determine the number and species of migrant stopover birds at 28 survey points along two transects. All birds that were visually or audibly detected at each survey point were recorded during 5-minute sampling periods. Survey points were distributed across varying elevations and targeted two major habitat types: mixed deciduous hardwood and mixed spruce and fir. A total of 460 individual birds were documented representing 43 species and 16 families. Overall relative abundance was 3.15 birds/point. Two avian Species of Special Concern, the chestnut-sided warbler and the white-throated sparrow, were documented

during the fall 2009 migrant stopover surveys. No federally listed threatened or endangered species were documented during the fall 2009 migrant stopover surveys.

Bat Acoustic Study

The fall 2009 field surveys included three months (July 15 to October 18) of passive bat monitoring using three acoustic bat detectors to quantify bat use of the project area. Two bat detectors were located on the on-site meteorological tower (high, 98.4 feet above ground level, and middle, 49.2 feet above ground level) and one detector was located at the on-site radar unit (low, 16.4 feet above ground level). Sampling for 96 nights resulted in 3,456 detector-hours and 482 bat call sequences. Detectors monitored bat echolocation calls for approximately 12 hours per night. The low detector had the highest rate of detection (3.30 call sequences/night) followed by the middle and high detectors with detection rates of 1.43 call sequences/night and 0.29 call sequences/night, respectively. Seven bat species were documented during the fall 2009 bat acoustic surveys. Two species of special concern were detected, the hoary bat (*Lasiurus cinereus)* and silver-haired bat (*Lasionycteris noctivagans)*. No calls from federally threatened or endangered species were recorded. The pattern of bat activity recorded during the fall 2009 field survey effort indicates that bats utilize the area at relatively low densities and that no definitive increase in bat activity at the project area was attributable to large-scale migration.

7.3.3 Post-construction Bird and Bat Monitoring Plan

As requested by Maine DIFW and USFWS staff, a post-construction bird and bat fatality monitoring plan has been developed for the Project.

SMW proposes to conduct two non-consecutive years of post-construction mortality surveys within the first five years of project operation. Surveys will include carcass searches, searcher efficiency trials, and scavenger removal assessments in order to estimate avian and bat collision mortality. Surveys will be conducted from April 1 through November 1. Before commencing any field work, SMW will consult with staff from the Maine DIFW and the Maine office of the USFWS to determine appropriate search intervals, appropriate number of turbines to be searched, and other logistical constraints related to the scavenger removal and searcher efficiency trials. The first year of surveys will take place after the wind energy facility is fully operational and a report of findings will be reviewed with Maine DIFW and USFWS staff. Adjustments to the study protocol will be made as deemed necessary and a second year of surveys will follow, likely during the third or fourth year of operation.

Mortality Searches

Bird and bat carcass searches will be conducted at up to five wind turbines in a 120-m by 120-m rectangular area at the base of each selected turbine site. Search plots will be centered at the base of the turbine tower and the search area will be separated into transects no more than 5 to 6 m apart and categorized into four visibility classes. Wind turbines at the end of the ridgeline turbine string will be included and the remaining three turbines will be spaced out equidistantly between them, while also choosing turbine sites that have the best terrain conditions to conduct surveys. Searches will be made twice per week during spring (April - May) and fall (August - October) migration seasons and once per week during the summer season.

Field surveyors will be trained in search protocol in advance of the first mortality searches. Transects at each of the turbines will be walked slowly to visually locate bird and bat carcasses, including portions of

carcasses. Search intervals will vary depending upon specific ground conditions but should be approximately 60 to 120 minutes per turbine location.

A standardized data sheet will be used for each search at each turbine. The data sheet will include detailed weather observations, time, date, and observer name and carcass species identification. Based on post-construction survey guidelines the data collected will also include:

I. Digital photographs of each carcass, including:
   1) the position in which it was found;
   2) the dorsal and ventral sides;
   3) photos that indicate the gender and reproductive condition of birds and bats (if possible); and
   4) any identifying characteristics such as bill, foot, wing or tail shape, and plumage coloration for birds.

II. Additionally, data collection will include:
   1) turbine number;
   2) location on plot marked with GPS coordinates;
   3) distance (estimated with a laser rangefinder) and cardinal direction from turbine;
   4) distance and bearing from transect from which it was first spotted;
   5) condition of carcass (whole or partial, extent of injury and some measure of decomposition to estimate time of death);
   6) position of carcass (face-up/down, sprawled, balled up, etc);
   7) species, age and sex, if determinable; and
   8) substrate conditions when found (gravel, short/long grass, crops, brush, etc).

Searches will be initiated during optimal weather conditions and will last from shortly after sunrise until all selected turbines have been surveyed. Carcasses found during the survey effort will be cataloged and stored in a locked freezer and submitted to the Maine DIFW every 2 months. If observers cannot determine species type because of only partial bird or bat carcasses being found, Maine DIFW staff will be asked to assist in species identification efforts. Where only clumps of feathers, rather than carcasses, are found observers will note them, but they will not be considered part of the mortality count. Any large mortality events or rare, threatened or endangered species found outside of the survey period will be reported to the appropriate Maine DIFW staff within 72 hours.

Weather conditions from the day prior to the surveys will be collected from local and national weather databases. On-site weather observations will be made using handheld anemometers and recorded on standardized data sheets. Data sheets will include temperature, cloud cover, wind direction and speed. Descriptions of visibility conditions the night prior to the mortality surveys will be made based on percent cloud cover and the presence of fog. Precipitation trends for the survey period will be compiled from local and national sources.

Carcass Removal Trials

Carcass removal by scavengers will be monitored using no less than 50 specimens per year and will be performed periodically throughout the survey season. Carcasses will include species found during mortality searches (when possible) and will include an equal assortment of small and large birds and bats (or tailless mice, as bat surrogates). Carcasses will be fresh, inconspicuously marked, and will be placed

in various ground cover types and at different turbine locations. Carcasses will be monitored for removal until the carcass disappears. During carcass checks, the location and condition of the carcass will be recorded on standardized data sheets to document the degree of scavenging over time. Incidental signs such as tracks or scat adjacent to the carcasses will also be identified and documented.

Searcher Efficiency Trials

In order to produce the best estimates of mortality, a number of individual searcher efficiency trials will be conducted periodically during the survey period to test searcher efficiency. Inconspicuously marked carcasses of various sizes, taxa and species will be left unbeknownst to the searcher at various turbines search locations and in various ground cover types. Carcasses will be collected and reused if missed by searchers. Record of how many days it took for a carcass to be found will be noted and the searcher efficiency findings, in combination with carcass removal results, will be factored into the mortality search results to calculate an estimated bird and bat mortality rate for the project site.

7.4 Fisheries

The Project will not adversely impact fish populations in the streams crossed by access roads or electric transmission lines. As shown in Table 7-2, there are 7 perennial and 15 intermittent streams located in the vicinity of the proposed SMW facilities. More detailed information on these field-surveyed waterbodies is included in Attachment 7-1. These streams are generally headwater streams of relatively narrow width. As stated in Section 7.1.4, three streams (two perennial and one intermittent) would require permanent crossings for construction of the proposed access road. Two additional intermittent streams would be temporarily altered during construction of the access road and restored following construction. An additional eight streams (two perennial and six intermittent) would be crossed with timber mat bridges during construction of the proposed electric transmission line. Stormwater management and erosion and sedimentation control measures have been proposed to minimize impacts to these waterbodies, both during construction and project operation (refer to Sections 12 and 14 for more detail).

The USFWS noted in a letter to SMW on November 17, 2009 (see Attachment 7-5) that that the streams in the project area are within the range of the federally endangered Gulf of Maine Distinct Population Segment of Atlantic salmon, specifically within the Androscoggin River watershed. Although the waterbodies potentially impacted by the Project are not in an area designated as critical habitat for the Atlantic salmon, it was requested that information on all stream crossings be shared with the USFWS and the USACE, and that information regarding erosion and sedimentation control measures be available for review by these agencies. This information is provided in Section 14 of this application for their review. Because these stream crossings are far up in the headwaters of the Androscoggin River watershed, SMW does not anticipate that the Project will negatively impact Atlantic salmon or its habitat.

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John E. Baldacci
Governor

Roland D. Martin
Commissioner

DEPARTMENT OF INLAND FISHERIES AND WILDLIFE

Wildlife Division – Region A
358 Shaker Rd.
Gray, ME 04039
Phone: (207) – 657-2345 x 110
Fax: (207) – 657-2980
Scott.Lindsay@maine.gov

July 6, 2010

Dawn Hallowell
Maine Dept. of Environmental Protection
312 Canco Rd.
Portland, ME 04103

RE: Spruce Mt. Wind Energy Project, Woodstock

Dear Dawn,

The MDIFW has completed review of the Site Location and NRPA Permit Application submitted by Spruce Mountain Wind, LLC for the development of the Spruce Mt. Wind Energy Project on Spruce Mt. in the Town of Woodstock. This project site is within a large area of the state designated for expedited permitting per recommendation of the 2008 Governor's Task Force on Wind Power Development and later by statute in LD2283.

Site Overview

The applicant has proposed to develop up to 10 2MW turbines or 11 1.5 MW turbines capable of producing a nameplate capacity of 20 MW annually, though typically wind turbines average 20-30% of nameplate or maximum capacity. Turbines are installed on concrete foundations in clearings approximately .5 acre in size and attain a total height of about 400 feet including tower and rotor. About 3.5 miles of new road is proposed. The road will begin at the Shagg Pond Rd. near the site of a proposed 1750 sq.ft. operations and maintenance building and will climb to the ridge and run alongside the 11 turbines for approximately 1.5 miles at an elevation ranging from about 2000 ft. to 2300 ft. Power generated at this site would be carried by 1.3 miles of new electric line to connect with existing CMP utility corridor on the Cushman Rd. to the south. Much of the electric line along the ridge would be underground in association with the road. The lines would become overhead in the vicinity of the southernmost turbine site, then descend to the Cushman Rd. The project is sited on a total of 2,879 acres, part of which is owned in fee by the applicant, the remainder is under a lease agreement.

Biological Surveys

Initial steps were undertaken by the applicant to evaluate the suitability of the Spruce Mt. site for industrial wind development. Pre-consultation was made with MDIFW to get preliminary data on wildlife species and habitats known to exist at the site. The applicant contracted out for a local environmental consulting firm (Tetra Tech EC, Inc.) to develop field survey methodology in coordination with MDIFW. The applicant, biologists from the field crew and MDIFW staff met on March 29, 2009 to discuss survey plans for the upcoming spring season. The surveys covered two periods, spring 2009 and summer/fall 2009. Spring 2009 surveys included avian radar, raptor migration, breeding bird and bat acoustic. Summer/Fall 2009 surveys included avian radar, migrant stopover, raptor migration and bat acoustic. Surveys pertaining to wildlife also included ones specific to Roaring Brook Mayfly and Northern Spring Salamanders. Wetland surveys included documentation of any potential vernal pools and amphibian breeding areas. Spruce Mountain does not provide habitat for Bicknell's Thrush, a bird on the Special Concern list in Maine. This bird is usually found at higher elevations in the scrub/shrub, krumholz cover type. Spruce Mountain is far south of the known range of Canada Lynx, a federally threatened species. The USFWS Orono Field Office would have additional information on migratory birds, vernal pools and Canada Lynx. The endangered Roaring Brook Mayfly was not found within the project site. The Northern Spring Salamander, a species of Special Concern, was found at four sites in the project site. One was found in a stream that will need to have a permanent crossing for the access road. This crossing will be fitted with an arch culvert, thus maintaining a natural substrate to facilitate stream use by the salamander and a other species.

Wetlands

Site work, including development of access road, ridgeline road, transmission line and turbine site installation will be done to DEP permitting standards to minimize sedimentation and erosion and avoid ecologically sensitive areas as much as practicable. There are a total of 51 wetlands that are either permanently or temporarily impacted on the current development plan. 10 of these wetlands qualify as Wetlands of Special Significance (WSS) due to being located within 25 feet of a stream, which is one of the criteria for this designation. No WWS were documented on the ridgeline. Vernal pool surveys were conducted between May 12 and May 22, in conformance with MDIFW guidelines. There were no vernal pools found in the project area which met the criteria for Significant Vernal Pools (SVP) under the Natural Resource Protection Act (NRPA), Chapter 335. There were small wetlands that did not qualify as SVP, but nonetheless may be utilized by amphibians. These wetlands were defined as potential vernal pools (PVP) or amphibian breeding areas (ABA). PVP5 is the only one documented on the ridge; just north of Turbine #2. It appears as though this wetland will not be impacted by the project. USFWS and USACE may have additional input on these wetlands as the definition of vernal pool may differ from NRPA, Chapter 335.Total wetland impact on the project site totals 26, 912 sq. ft., of which 5, 718 feet is permanent impact. According to DEP rules, compensation for wetland impact is addressed when permanent wetland impact exceeds 15,000 sq.ft.

Wildlife

As a general statement, MDIFW's review focuses upon impact assessments and management recommendations for State-listed Endangered, Threatened and Species of Special Concern as defined and regulated under the Maine Endangered Species Act, fisheries and other aquatic species and their habitats and Significant Wildlife Habitats as defined and regulated under the Maine Natural Resource Protection Act, and other wildlife species and their habitats as recognized and regulated under the Site Location Act.

Surveys were conducted for the Roaring Brook Mayfly (Endangered) and the Northern Spring Salamander (Special Concern). Survey methodology was developed in coordination with MDIFW staff.

No occurrences of Roaring Brook Mayfly were documented at this project site. Northern Spring Salamander was documented in 4 streams within the project site. These included 10 larval and 3 adult individuals in the following streams; OS93, AS69, TS12 and TS18. Three of those streams (AS69, TS12, TS18) would be crossed by the proposed access road or transmission line corridor. AS69 would be both "permanently" and "temporarily" impacted by the access road. TS12 and TS18 would be "temporarily" impacted by the proposed transmission line corridor. The fourth stream (OS93) would not be crossed, but the proposed access road and Operations and Maintenance (O&M) Facility appear to be within 100-150 feet of the stream channel. The wetlands report states that the original proposed location of the O&M building was on the opposite (stream) side of the proposed access road, but it was moved specifically to avoid impacting the stream and leave a larger forested buffer. However, the construction footprint, as currently proposed, is still well inside the 250 foot riparian buffer recommended by MDIFW to maintain integrity of the spring salamander habitat. Attached is a copy of the management guidelines recommended by the MDIFW Reptile & Invertebrate Group staff. These guidelines, if implemented should avoid or minimize take and adverse impact to Northern Spring Salamanders founds within the project site. Thus, MDIFW recommends these guidelines, including the maintenance of a 250 ft. forested buffer, be applied to all four streams with Northern Spring Salamander occurrences.

Other than the bird and bat species listed below, there are no other wildlife species listed at Threatened, Endangered or Special Concern known to occur at this project site. There are no known occurrences of Significant or Essential Wildlife Habitat on the project site.

Bird Data

Avian Radar Survey

The avian radar study used a portable radar system employing both x and s band radar for a period of 30 days/nights in the spring and 57 days/nights in the fall at the summit of Spruce Mt. During the spring the radar unit detected 409 targets/km/hr with 76% of the hits occurring above the rotor swept zone (RSZ). This compares to the fall period, during which the unit detected 480 targets/km/hr with 79.2% of hits above the RSZ. Average flight height was 366 m. in the spring. Radar data is not species specific. Though the passage rates of birds during both the spring and fall seasons is consistent with data I have seen from other project sites in Maine, the percentage of bird passage within and below the RSZ is higher; at 16.5% and 20.8% during the spring and summer, respectively. The birds passing within and below the RSZ would be more vulnerable to mortality during turbine operation. It should be noted that the type of radar used at Spruce may not be used at other sites, so this lack of standardization could likely account for the difference in data. For this reason, it is highly recommended that survey methodologies be standardized so that comparisons of data between locations is more accurate.

Migrant Stopover Surveys

This survey was conducted by field staff in Spring and Fall. Species were identified visually and audibly along established transects. 43 species of birds were represented. 479 and 460 birds were observed during the spring and fall, respectively. Black-capped chickadees, juncos, ravens and golden crowned kinglets were most numerous in the fall. Most of these survey points were below 600m and thus below the RSZ of 35-130 m. at this site. The data suggests that Spruce Mt. is not a major migratory stopping point.

Breeding Bird Survey

This survey was conducted on transects throughout the month of June. 336 birds, representing 43 species were documented. Frequently observed species include the ovenbird, black throated blue warbler, hermit thrush and red-eyed vireo. Most of these species were observed above 2,000 elevation, thus potentially within the RSZ. The availability of both mixed wood habitats at lower elevations and softwood stands at higher elevations does provide a variety of nesting sites for different species .

The following species passed through the project area. These birds are considered bird Species of Greatest Conservation Need, as outlined in Maine's State Wildlife Action Plan:

Scarlet tanager, veery, wood thrush, black and white warbler, blackburnian warbler, , black throated green warbler, cape may warbler, chestnut sided warbler, northern parula, prairie warbler, barred owl, olive sided flycatcher

These species, listed as species of Special Concern in Maine, were also believed to be present:

Northern harrier, bald eagle, and white-throated sparrow

Raptor Migration Survey

Raptor migration surveys were conducted by field biologists during the spring and fall from a fixed observation point at 2,430 ft. elevation. The entire project site was visible from this location.

The spring survey occurred on 10 days between April 5 and May 19. 206 raptors were observed, representing 13 species. The average passage rate was 3.32 birds/hour. Peak passage occurred between 0900hr and 1600hr. Though the site is quite different in terms of location and surrounding topography, comparable surveys from Bradbury Mt. in Pownal yielded 1,144 raptors and 16 birds/hour. Broad winged hawk and turkey vulture and osprey were the most common species observed. Two bald eagles and one northern harrier, both species of Special Concern in Maine, were observed; though both were observed traveling on the side slopes and not along the summit ridge. In addition, the data indicates most raptors were traveling along the side slopes of the mountain and the adjacent valleys where thermals are more likely to develop. During the spring season, 52% of the raptors were traveling above the RSZ, 40% were within the RSZ and 8% were below the RSZ. Though the number of raptors observed do not appear to be exceptional, the percentage observed within and below RSZ does suggest more vulnerability at an operational site. Raptor populations, being longer lived species with lower reproductive potential would be less able to absorb mortality at turbine sites than passerines, thus it would be important to collect good post-construction data to help evaluate actual impact at the site. It has also been suggested that the clearings developed at turbine sites may attract raptors more likely to feed to small mammals and birds in the open. This could lead to higher potential for raptor mortality at an operational turbine site. This potential problem would need to be considered during post-construction survey methodology and operational guidelines if a turbine caused unreasonable raptor mortality.

The fall survey occurred on 10 days between August 28 and October 15. 107 raptors were observed, representing 11 species. The average passage rate was 1.79 birds/hour. Mid-September was the peak of raptor activity at this site. During the fall survey, 80% of raptors were observed above the RSZ, 12% were within the RSZ and 7% were below the RSZ. Most of the raptors used flight paths that did not coincide with the ridge proposed for the turbine placement. Broad-winged hawk, sharp-shinned hawk, turkey vulture and red-tailed hawk were the most common species observed. Of these, red-tailed hawks and sharp-shinned hawks were most often observed at elevations within the RSZ. Two state endangered

species were observed during the fall migration; two peregrine falcons and a golden eagle. The falcons were both above the RSZ. The golden eagle was within the RSZ, but its flight path was over the valley and slopes of the mountain, not over the ridge where turbines are proposed.

Bat Data

Up until 2001, there was little recognition of the potential impact of industrial wind developments on bats. Prior to this time, much of the wind energy developments occurred in more open landscapes of the west and mid-west. As wind energy developments became more prevalent in the heavily forested ridges of the east, bat mortalities found in post-construction surveys in Tennessee and Pennsylvania became more of a concern. Though there is little data representative of Maine sites, data from other parts of the country indicate migratory, tree roosting bats are most vulnerable at industrial wind developments. In Maine, these species would include the red bat, hoary bat and silver haired bat.

The spring bat surveys at Spruce Mountain occurred continuously for the months of April and May using 3 monitors positioned at varying heights above ground to better assess bat use on the project area. This methodology provided good data over 732 detector hours, with the monitors collecting data 12 hrs./night. Results from the spring revealed 16 bat call sequences, likely representing 4 species, including a low occurrence of hoary bat and silver haired bat, both species of Special Concern in Maine. The data varied from .05 call sequences/night at the low and high detectors to 0.16 call sequences/night at the middle detector. The extent of bat use in the spring at this site is low compared to the limited data at other Maine sites and the average at most sites across the country.

The fall bat surveys entailed 3,456 detector hours of a 3 month period from July 15 – October 18. During this time, there were 482 bat call sequences, yielding an average of 1.67 call sequences/night. Nearly 50% of calls were likely those of myotis species. As in the spring surveys, hoary, silver haired and possibly small footed myotis, all species of Special Concern in Maine, were documented in smaller numbers. Based upon the limited data from Maine and more extensive data elsewhere, it appears consistent that late August through early September coincides with the period of greatest bat passage. This is the time of year bats are traveling to local hibernacula or migrating out of the region for winter. The fall data from Spruce Mountain appears to be similar or lower to that of other sites proposed for wind power development in Maine.

Though data on bat behavior is limited compared to research on birds, there have been some valuable observations, from both Spruce Mt. and elsewhere, that will help minimize mortality at sites proposed for industrial wind development. Bats are most frequently active 1 hr. before sunset to 1 hr. after sunrise. They are most active at times when foraging on insects in most productive. These conditions normally are found when wind speeds are less than 6 m/s. Other conditions that seem to correlate with peak activity include those periods immediately before and after the passing of low pressure storm fronts and periods of temperature inversions in which cooler air, low clouds and fog at lower elevations may force bats to forage in more favorable conditions at higher elevations. This information can help predict conditions in which the potential of bat mortalities would increase during operation of an industrial wind development. Lighting of wind turbines is another issue that may have implications on bat behavior. Given the 400 ft. total height of the turbines proposed for Spruce Mt., lighting is required by the FAA. This type of lighting would include red or white strobes with a three second pause on selected towers within the entire array. Though the data is limited at this point, the FAA lighting requirements do not appear to attract bats. The clearings developed at turbine sites may be attractive to bats since insect prey would be more numerous. Insects may be attracted to the opening itself and/or any heat produced by the turbine nacelle. Though clearings at the proposed size are needed for the operation of the turbine, the turbine nacelle should be insulated as much as practical to minimize insect attraction. It is also recommended that there be no source of steady lighting at the access point to the turbine monopole. This type of steady light would

likely be attractive to bats. It has been suggested that the turbine monopole itself may attract bats that perceive it as a potential roost site. Noise, both audible and ultrasonic may attract bats to the turbine site. Low pressure produced in the vortex of turbine blades has been implicated in the death of bats without contact between the blade and the bat. This is known at barotrauma. Since the echolocation used by many species of bats is most effective within 10 meters, death by direct contact or barotrauma is possible since reaction time may not permit avoidance.

Though many of these theories have not been thoroughly tested, current observations indicate they warrant further study. Since this type of development is fairly recent in the northeast landscape, there has been less than 10 years of research effort. Nationwide, it appears overall that bat mortalities at surveyed turbine sites is low, though there are exceptions, such as sites in Tennessee and Pennsylvania. Known mortality rates for bats range from 0 to 47.5 bats/turbine/year. Nationwide, the average is about 3 bats/turbine/year. Post-construction surveys at the operational Mars Hill, Maine turbine site yielded a mortality rate, after correction, of 2.04 birds/turbine/year.

Landscape Level Impact to Wildlife

Based upon a review of the most current records, there are no known occurrences of significant or essential wildlife habitat within the project area. There are no state listed threatened or endangered species known to reside in the project area, though the endangered peregrine falcon and endangered golden eagle were observed in transit during the raptor surveys. Though there are no known peregrine falcon eyries within the project area, current and historic eyries within 10 miles occur on Bald Mt. and Buck's Ledge in Woodstock and Speckled Mt., Ragged Jack Mt. and Tumbledown Dick Mt. in Peru. The eyrie showing most activity, including the current year, is Buck's Ledge, located above North Pond in Woodstock.

As stated previously, it is difficult to assess the landscape level impact to habitat or wildlife populations. Though overall species diversity may be lower at higher elevation sites, as compared to lower elevation sites, the mix of softwood and hardwood stands at various ages on Spruce Mt. is utilized by a variety of birds and mammals, some of which prefer this habitat type. Currently, this habitat is not rare in Maine. Other than a dozen ski areas statewide, higher elevation habitat is not permanently developed in Maine. As shown on Beginning with Habitat Map 3, available through our Beginning with Habitat Program, Spruce Mt. is within a 20,685 acre undeveloped block in Woodstock. This is the largest undeveloped block of land in the town. Species which benefit from large blocks of undeveloped habitat include those mammals with large home ranges such as moose, bear and bobcat. Fragmentation from development, roads and utility lines can have negative local and cumulative impact on wildlife. In Section 28 – Tangible Benefits, the applicant has indicated up to 1,000 acres of the property may be protected by a conservation easement. MDIFW supports easements that permit traditional recreation use, including hunting, fishing and trapping.

Post-Construction Monitoring

This application includes a post construction monitoring plan which would include carcass searches, searcher efficiency trials and scavenger removal assessments during two non-consecutive years within the first five years of operation. The purpose of these surveys is to quantify the turbine caused mortality of birds and bats at the Spruce Mt. site, once operational. The surveys will be done by contract biologists hired by Patriot Renewables, LLC. These biologists and representatives from Patriot Renewables, LLC have met with MDIFW staff on two occasions to discuss the details of this project, including the post-construction monitoring plan. There are several logistical difficulties in surveying for bird and bat carcasses at this type of site. The survey transects will be difficult to access and the dense tree cover throughout the ridge would likely prevent any turbine caused mortalities from reaching the ground.

Carcasses which do reach the ground may be projected beyond the survey transects under certain conditions and thus not be counted, though carcass surveys at the operational Mars Hill site indicated few were found outside the cleared turbine apron. Carcasses which do reach the ground may be fed upon and/or removed by scavengers and thus not be counted. The survey methodology does take these issues into consideration and correct for them as much as possible. Despite the quality of the methodology, it is expected the results will underestimate mortality.

The surveys will entail 2 surveys per week at 5 of the 11 proposed turbines during the spring and fall and one survey per week at 5 turbines during the summer. The surveys will commence in the first year of operation. MDIFW will review survey results after Year 1 and recommend any changes necessary. Surveys would continue, incorporating any changes recommended by MDIFW, in one more non-consecutive year within the first five years in operation, thus surveys would follow in either Year 3 or Year 4. Year 3 surveys would be preferred. At this time, the site would have been developed for three years. It would also indicate any problems that need to be addressed sooner than later. It has been proposed that the five turbines within the eleven be surveyed, representing both ends of the array and the center. MDIFW recommends the surveys be conducted on all 11 turbines. This would be consistent to the methodology employed at the Mars Hill site. The additional post-construction survey is justified given the scarcity of data for Maine sites and the interest in acquiring site-specific data. In addition, survey results will be evaluated by MDIFW staff and the applicant and MDIFW may recommend one or more adaptive management guidelines in an effort to minimize wildlife mortalities at one or more turbine sites. These could include operational curtailments during periods of high mortality risk and/or temporary or permanent shutdown of individual turbines. It is expected that the applicant and MDIFW will meet again prior to the installation of any turbines to refine the post-construction survey methodology.

Sincerely,

Scott Lindsay

Scott Lindsay
Regional Wildlife Biologist

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MANAGEMENT GUIDELINES FOR LAND USE IN OR ADJACENT TO SPRING SALAMANDER AND ROARING BROOK MAYFLY HABITAT

Maine Department of Inland Fisheries and Wildlife
July 9, 2010

To protect the integrity of stream habitats with documented or potential occurrences of Roaring Brook Mayfly (Endangered) or Spring Salamander (Special Concern), MDIFW recommends the following guidelines for development and/or forestry activities proposed in or near the stream channel. The goal is to avoid or minimize impacts to these rare species and their habitat. If impacts are unavoidable, mitigation may be required to compensate for Take or Harassment of the Roaring Brook Mayfly under Maine's Endangered Species Act [12MRSA, Chpt. 925, §12808] or to comply with the "no adverse effect" standard for the Spring Salamander under Maine's Site Location Law [38MRSA, §484 (3)].

Sites having potentially suitable habitat should be surveyed for the presence of Roaring Brook Mayfly or Spring Salamander prior to any disturbance of riparian vegetation in preparation for development projects, using survey protocols recommended and approved by MDIFW. In the absence of surveys, suitable stream habitat should be considered as potentially occupied and the following guidelines implemented.

Management Guidelines:

- No construction activities, use of machinery, or other disturbances should occur within the stream channel except as necessary to place stream crossing structures per the standards below.

- Maintain a riparian buffer of 250 feet, within which the first 25 feet from the stream be retained as a no-cut and no-disturbance zone; and the remaining 25-250 feet be maintained with no less than 60-70% forest canopy cover using single-tree or small-group selection cuts.

- No development or permanent land use conversion should occur within the 250 ft. riparian buffer. Permanent land use conversion includes any alteration that prevents succession of riparian vegetation to its formerly natural state (e.g., gravel and winter roads, turbine pads and laydown areas, log landings, buildings). Powerline right-of-way crossings should meet minimum performance standards as defined for Maine's Site Location of Development law (ME DEP Rules, Chapter 375, Appendix A, Section 2)[1]

- Stream-crossings should be avoided. If crossings are unavoidable, they should be minimized to a narrow trail with forest canopy cover maintained to the greatest extent possible. Crossing structures should span at least 1.5 times the bankfull width of the stream channel and provide an openness ratio[2] of at least 0.60 meters. In the case of permanent crossings, a spanning arch or bridge structure is recommended. Current, published Best Management Practices for stream crossings should be followed in order to prevent erosion, sedimentation, alteration of stream flow, or other impacts to stream habitat. Within 100 feet of the stream, existing forest canopy cover should be maintained or allowed to regenerate along both shoulders of the road to the greatest extent possible.

- Avoid the use of herbicides or pesticides within the 250 ft. riparian buffer. Exceptions may be considered depending on product and circumstance following consultation with MDIFW biologists.

[1] draft text available at
http://www.maine.gov/dep/blwq/topic/site_storm_revisions/site_rules/fourth_informal_draft/APPENDIX_A_2_cl.pdf

[2] The openness aspect or "ratio" of a structure is defined as the width times the height of the structure, which is then divided by the total length of the structure (Maine DOT publication "Waterway and Wildlife Crossing Policy and Design Guide", 3rd edition, July 2008)